

REMARKS

The Office Action of December 2, 2005 has been received and its contents carefully considered. An RCE is being filed concurrently to relieve this application of its finally-rejected status.

The present Amendment revises independent claim 21 in several respects. In particular, a new limitation has been added; it provides that a fillet is formed when first and corresponding second bumps are heated, and that this fillet covers at least part of the side wall of the smaller of the first and corresponding second bumps. This new limitation is support (for example) by paragraph [0065] of the application, and by Figure 2A.

The present Amendment also adds new claims 27-34 to further protect the invention. One of these new claims (claim 30) is independent. It is similar to independent claim 21 but differs somewhat in wording. In particular, claim 30 specifies only one first bump and one second bump (which, of course, does not exclude additional first and second bumps).

The Office Action rejects claim 21 for obviousness based on patent 5,796,591 to Dalal et al and patent 5,930,597 to Call et al. These references will hereafter be called simply "Dalal" and "Call" for the sake of convenience. For the reasons discussed below, it is respectfully submitted that the inventions now defined by independent claims 21 and 30 are patentable over these references.

The Dalal reference discloses a chip 30 having a solder ball 38 with a low-melting point cap 41. The chip 30 is electrically connected to a laminate 10 via an element that is exposed through an opening 24 in a coating of insulator material 22. This element includes a chromium layer 18 and a copper layer 20.

The Call reference discloses a chip 11 having pads 12. Solder bumps 13 are attached to the pads 12 in order to connect the chip 11 to pads 14 on a substrate 15. Wetting action of the solder during the joining process causes self-alignment.

Claim 1 recites that first bumps are provided on a first chip or substrate and that second bumps are provided on a second chip. This is not disclosed by either reference. More importantly, claim 1 now recites that “one of said first bumps and corresponding second bumps is smaller in diameter than the other, and said first and corresponding second bumps are joined by heating such that a fillet is formed and covers at least part of a side wall of the smaller of said first and corresponding second bumps.” It is respectfully submitted that neither reference suggests using bumps having different sizes, and forming a fillet which covers at least part of the side wall of the smaller bump.

New independent claim 30 provides that first and second bumps have substantially flat ends, and that “the end of one of the first and second bumps has an area smaller than the end of the other first and second bumps, and a fillet ... forms during the heating step and covers at least part of a side wall of the first or second bump with the end having the smaller area.” For reasons along the lines discussed above with respect to claim 21, it is respectfully submitted that this is neither disclosed nor suggested by the references.

The remaining claims depend from the independent claims discussed above and recite additional limitations to further define the invention. They are therefore patentable along with their independent claims and need not be further discussed.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. Reconsideration of the application is therefore respectfully requested.

Respectfully submitted,

A handwritten signature in cursive script that reads "Allen Wood". The signature is written in dark ink and is positioned above a horizontal line.

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